



## **Presentation of Weather Information In the Cockpits of Transport Airplanes**

Jon Jonsson, Ph.D.  
NASA Langley  
Crew Systems Branch

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## **AWIN Element Objectives**

- Develop technologies and methods for providing pilots with sufficiently accurate, timely and intuitive information which, if implemented, will enable 25 to 50% reduction in aircraft accidents attributable to lack of weather situational awareness
- Develop enhanced weather presentation minimizing the need for interpretation and training, that improve situational awareness, pilot engagement and reduce workload
- Develop aids to improving decision making and provide guidance for the use and design of cockpit weather systems
- Transfer AWIN technologies to the industry



## AWIN Transport Element Progress

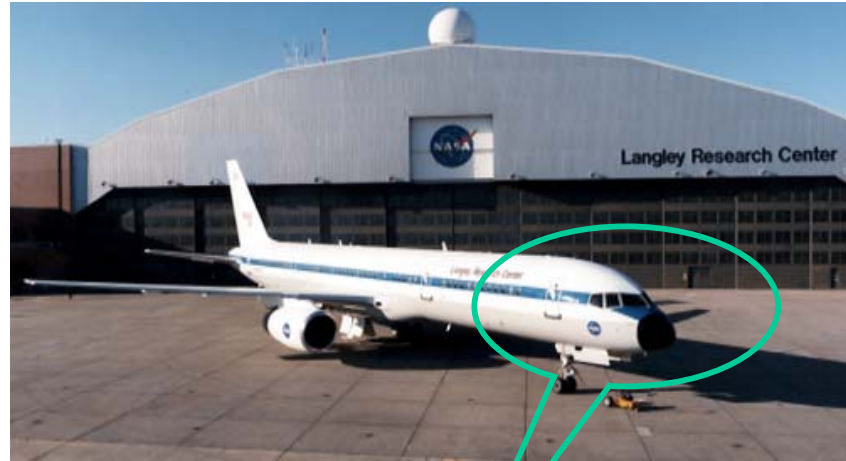
- **Charlie Scanlon**



- Honeywell Weather Information Network (WINN) CRA
  - In-Service Evaluation with United Airlines (2001)
  - World Flight with Singapore & UAE (2002) [Cabin Based]
- Initial AWIN Concept Flight Evaluation on ARIES (2000)
- AWIN Concept of Operations Document (2001)
- Prototype Airborne Hazard Awareness System (AHAS) (2002)
  - Flown on ARIES but no cockpit display.
- AWIN Concept Flight Evaluation on ARIES (2003)



## NASA B-757 ARIES



**Flight Deck Research  
Station (FDRS)**

**Conventional B-757**

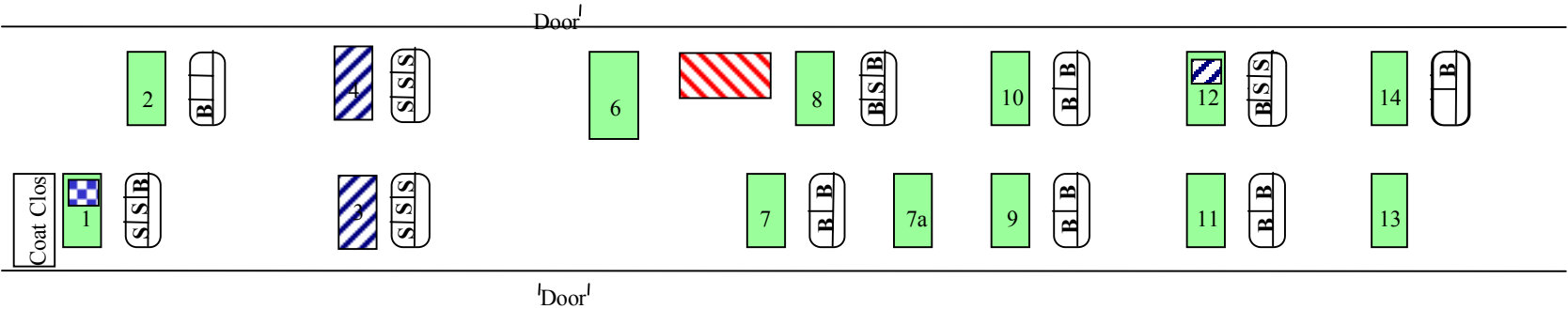
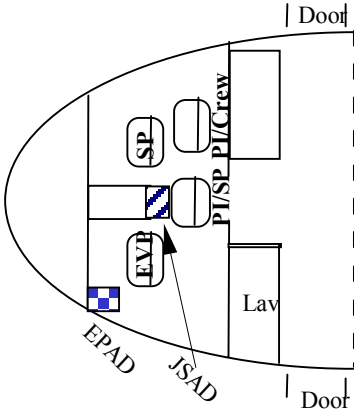


## WINN Cockpit Display on NASA B-757

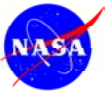




# Cabin Layout for B-757 ARIES



S. V. Harrison



## WINN United Airline Flights



Courtesy Joe Burns

### WINN Graphical Sigmets



Courtesy Joe Burns



## **NASA ARIES and WINN UAL Flight Findings**

- Overall weather display interface intuitive to pilots
- Bezel buttons or mouse/stylus preferable to touch screen to access weather products
- Overall weather situational awareness improved
- Most weather products useful for decision making
- Time and fuel savings
- Interface location and display quality are non-trivial
- Weather product age is critical
- Weather information displays useful for turbulence avoidance

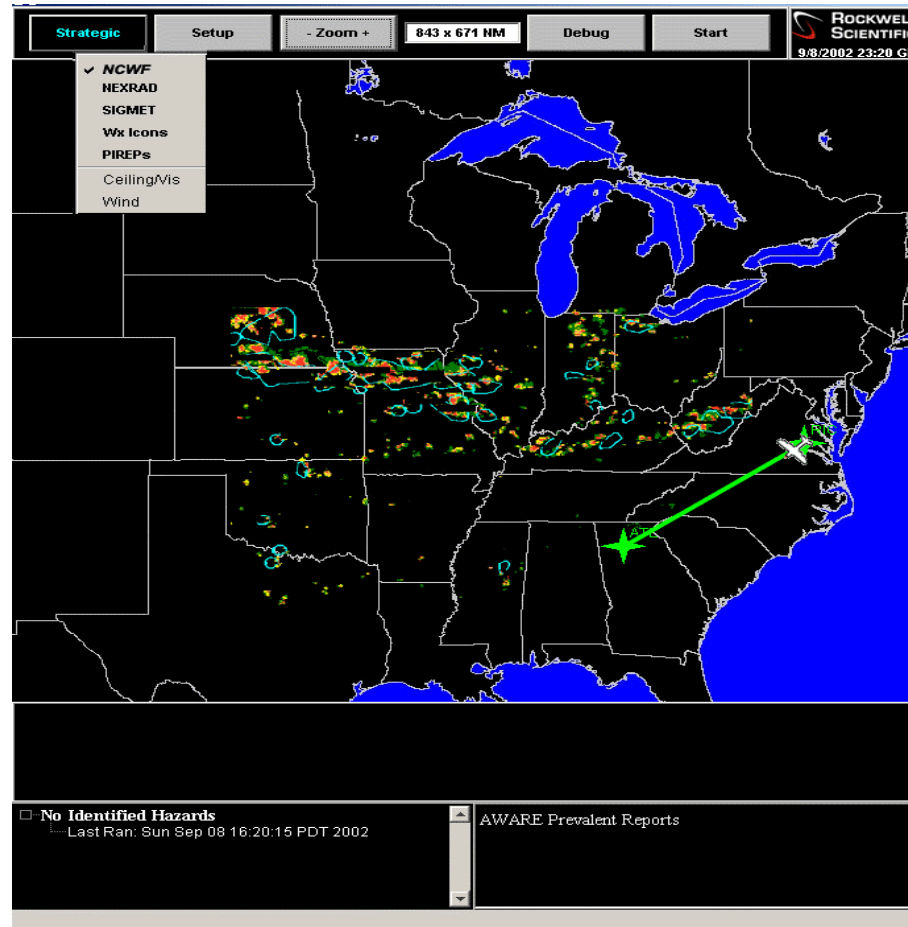


## Rockwell AHAS Weather System on NASA 757

- The Airborne Hazard Awareness System (AHAS) is an integrated weather tool providing pilots with access to textual and graphical weather data.
- The system employs decision aids to analyze the weather data from both on-board sensors and datalinked weather information.
- Two types of weather products are provided to the pilot:
  - Tactical Weather Products
  - Strategic Weather Products
- The first implementation of AHAS flew on the B-757 ARIES as part of WxAP '02 flight experiments with the display weather products being evaluated at research pallets in the cabin.
- Piloted cockpit evaluation of AHAS is planned as part of the WxAP '03 flight experiments.



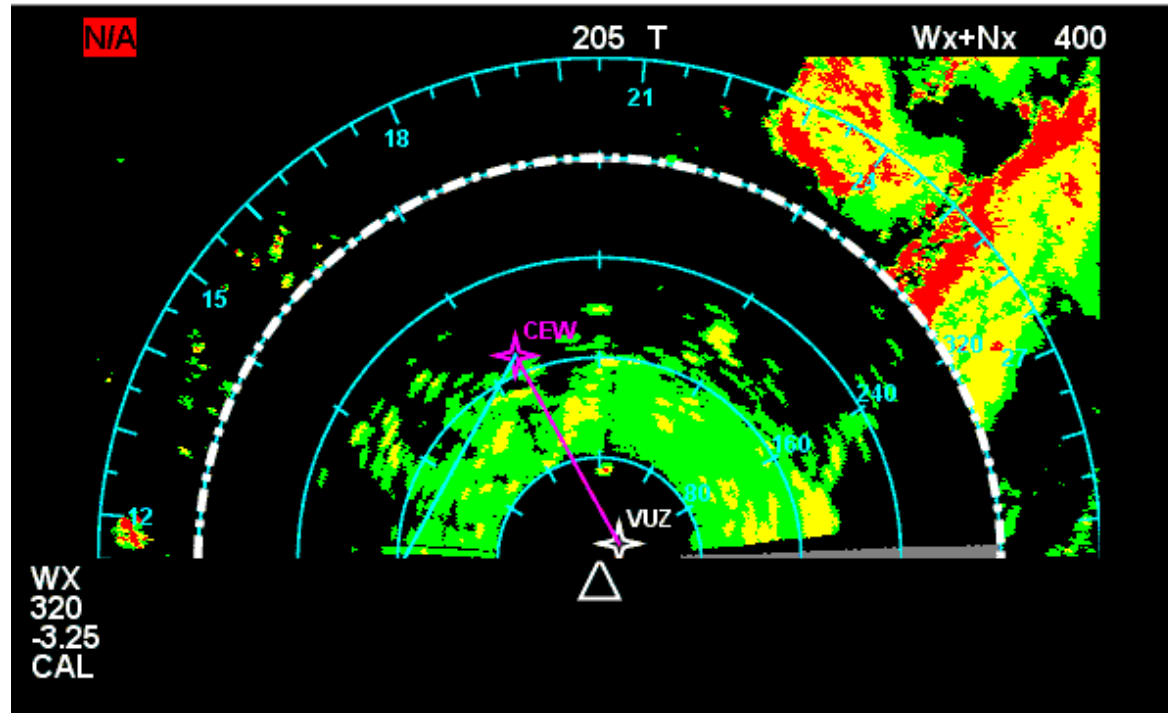
## AHAS Strategic Mode with NCWF



NASA CR 9/02



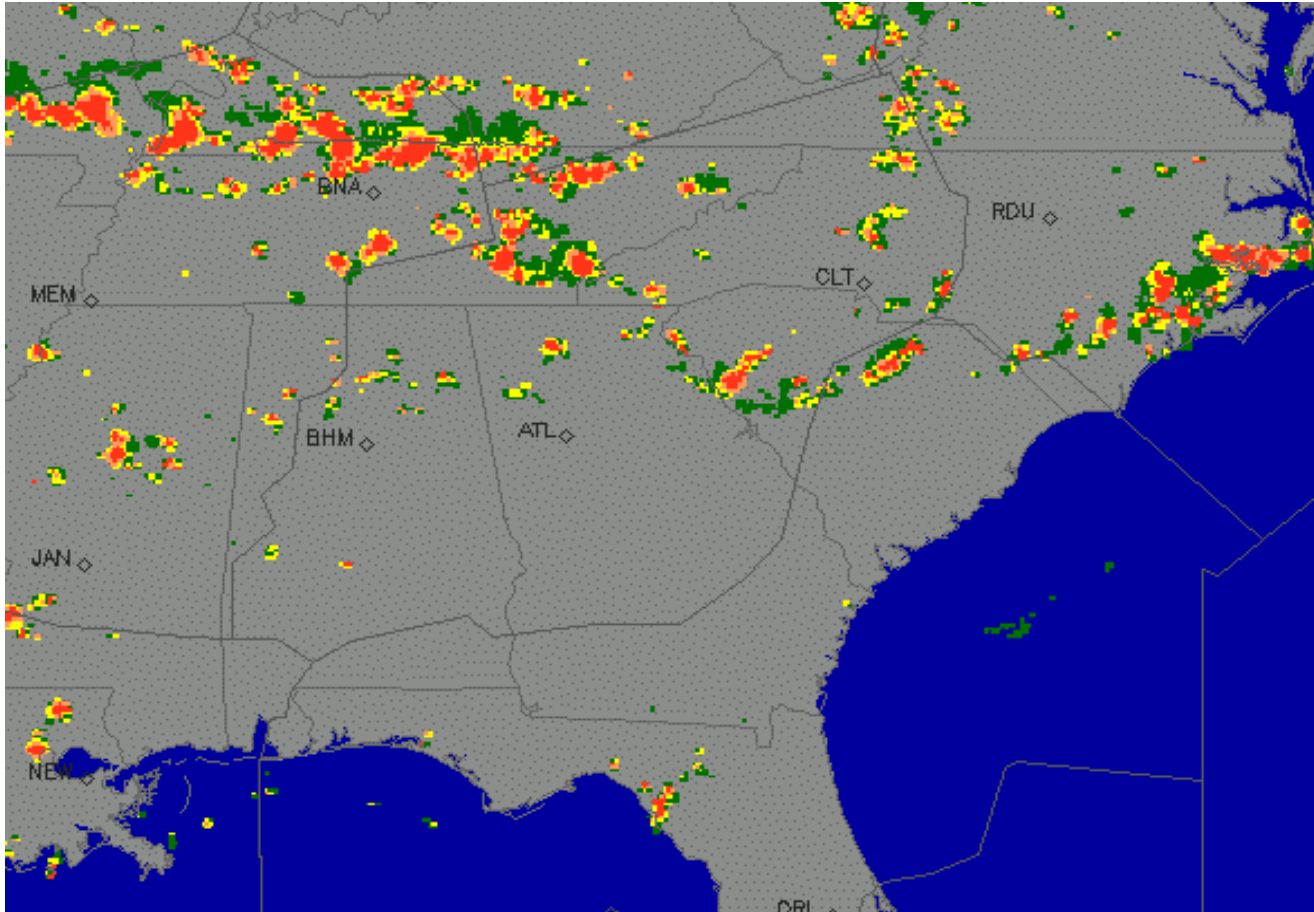
### AHAS Tactical Mode



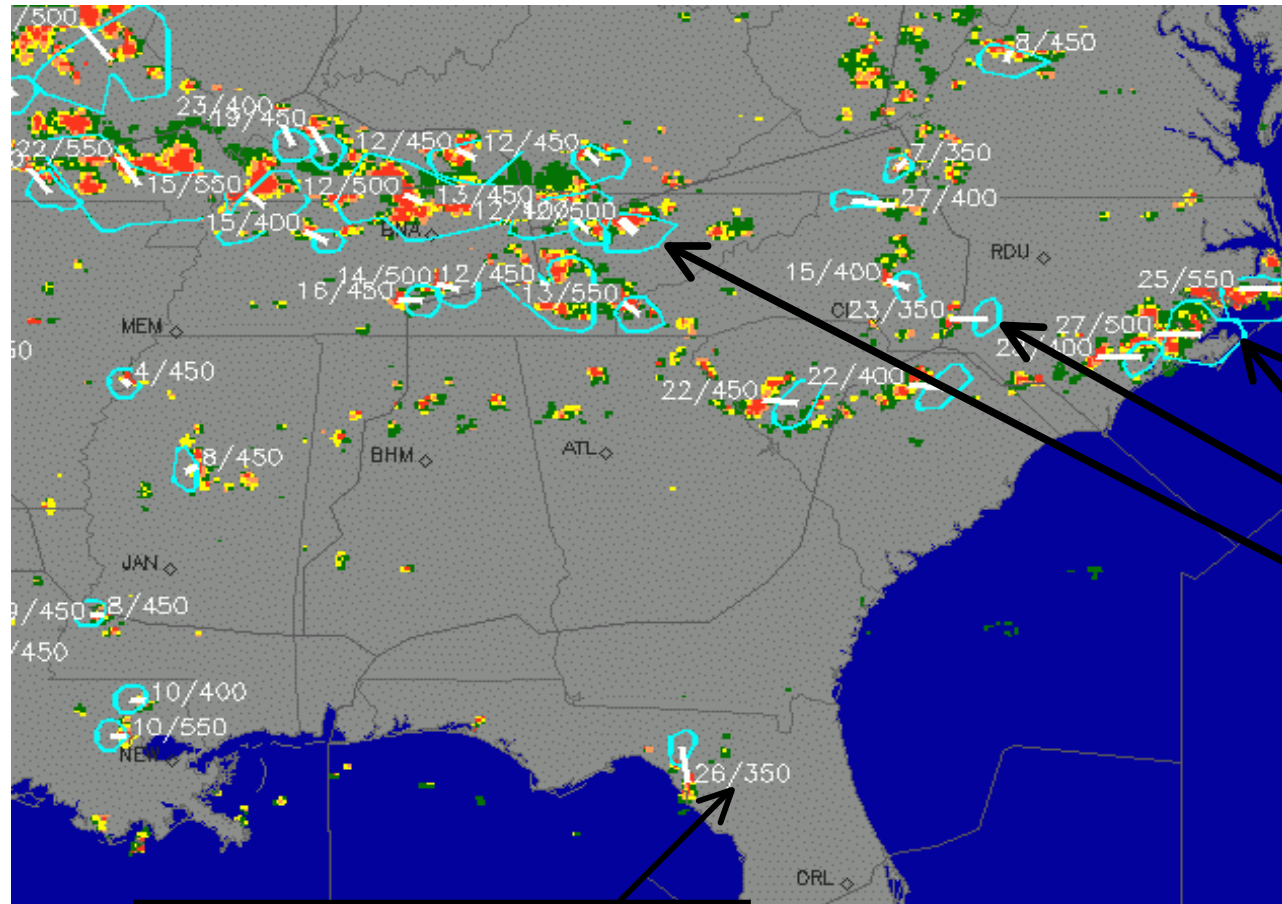
NASA CR 9/02



## NCWD Current Convection Product

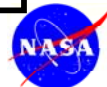


### NCWF One Hour Forecast Product



Blue areas:  
1 hr extrapolation  
forecast of  
thunderstorm  
hazard locations

Speed (knots) & Echo Tops (100s)





## Summary

- Excellent progress made in evaluating new weather displays in both the research environment and with commercial partners on transport type aircraft
- Results to date show high pilot acceptance of new weather displays and improved situational awareness
- Much research remains in the area of providing weather *information* to the pilot as opposed to weather *data*

